International Journal of Infectious Diseases (2009) **13**, e514—e516

http://intl.elsevierhealth.com/journals/ijid

LETTER TO THE EDITOR

Pin-site myiasis: an emerging infectious complication of external bone fixation?

Among the most common and devastating complications of an open fracture is infection, which has a reported incidence of 3—40%.[1] The orthopedic management of open fractures, particularly those that are severe, continues to be external fixation using metallic pins; this is associated with different complications, including infection.[2] Typically bacterial in origin, most pin-site infections are treated effectively by pin removal and wound care with or without antibiotics, but other infectious complications, although rare, have been reported.[1—3] Recently, there have been an increasing number of reports about myiasis as a complication of fracture treatment by means of external fixation.[3—5] Myiasis is a condition in which a human being or other mammal is infected by Diptera larvae (maggots).[6] Herein, we report the sixth case of pin-site myiasis, in a patient with a treated femoral fracture.

A 32-year-old male, from Bejuquero, Falcón, located in north-western Venezuela, presented six years ago with an open fracture of the middle third of the femur after a motor-vehicle crash. He had multiple surgical corrections of the fracture, most recently with the insertion of an external skeletal fixator of the femur. One week after discharge, he presented again with a primary complaint of purulent secretion and maggots at one of the pin sites. At the pin site, mild inflammation of the peripheral tissue was evident, with a wound approximately 4 cm in diameter. The patient subsequently underwent debridement and irrigation of the lesion to force the maggots (in total 300) to come out of the wound. These were identified as *Cochliomyia hominivorax* (Figure 1). No bacterial infection was evident, but antimicrobial prophylaxis was given with intravenous oxacillin 1 g q16 h and intravenous ciprofloxacin 500 mg q12 h, both for seven days. After careful evaluation, it was decided not to remove the pin; the wound was covered with a small mosquito net, and repeated daily debridement and irrigation of the wound and close follow-up were carried out, with a successful clinical outcome for the patient.

Figure 1 Morphological identification of the larvae of *Cochliomyia hominivorax* at microscope.

A pin-site infection of bacterial origin is treated by local wound care, systemic antibiotics and, sometimes, removal of the pin with placement at an alternative site.[1—3] Additionally, hyperbaric oxygen therapy would have a positive effect on the vascular perfusion, as has been reported with intramedullary nailed simple tibial shaft fractures.[7] Until recent years, parasitic infections have not been reported as a complication of the management of open fracture treatments and, although bacterial infections continue to be the most common infectious complication, the emergence of myiasis as another etiology should be considered, properly diagnosed, managed and prevented.[6] Table 1 summarizes the major features of the five previously reported cases of pin-site myiasis found in the literature and this current report. This form of traumatic myiasis occurred as a result of the invasion of tissue by larvae deposited by flies in suppurating wounds, ulcers, or areas with decomposition and necrosis. From these cases, it is concluded that diabetes, immobilization, drug and alcohol abuse, poor hygiene and low immune status are predisposing factors for the development of pin-site myiasis, a rare but emerging infectious complication of external fixation for the treatment of fractures.[3—5]

Conflict of interest: No conflict of interest to declare.

doi:10.1016/j.ijid.2008.10.002

Table 1 Summary of pin-site myiasis cases reported in the literature

Case	Reference	Year	Country	Age, Sex	Anatomical location of pin-site myiasis	Removal of the EBF	Bacterial co-infection	Identified larvae	Number of specimens extracted	Risk factors and/or co-morbidities
1	[3]	2005	USA	39, F	Halo orthosis placed for the management of a gunshot wound to the neck, producing an extensive comminuted fracture involving the right C6—7 facet and extending to the lamina of C7	Yes	No	Diptera larvae (maggots); no species identified	Several, not specified	Drug abuse, high-dose steroid use, poor care of pin site, lack of close follow-up
2	[4]	2008	Venezuela	32, M	External skeletal fixation of an open fracture of the tibia after motor vehicle crash trauma	Yes	Yes: *Providencia stuartii* and *Pseudomonas aeruginosa*	*Cochliomyia hominivorax*	105	Alcohol and drug (crack cocaine) abuse, poor care of pin site, lack of close follow-up
3	[5]	2008	Greece	67, F	Open reduction and internal fixation of a malleolar fracture	Yes	No	Maggots; no species identified	Not specified	Insulin-dependent diabetes with hyperglycemia, neuropathic arthropathy, immobilization, poor care of pin site, lack of close follow-up
4	[5]	2008	Greece	78, M	External fixation of a trochanteric fracture of the femur	No	No	Maggots; no species identified	Not specified	Non-insulin-dependent diabetes with hyperglycemia, mild anemia, low lymphocyte count and low protein serum levels
5	[5]	2008	Greece	86, M	External fixation of a trochanteric fracture of the femur	No	No	Maggots; no species identified	Not specified	Non-insulin-dependent diabetes with hyperglycemia, mild anemia, low lymphocyte count and low protein serum levels
6	Current report	2008	Venezuela	32, M	External skeletal fixation of an open fracture of the femur after motor vehicle crash trauma	No	No	*Cochliomyia hominivorax*	300	Multiple previous surgical interventions

EBF = External bone fixation.

References

1. Brown PW. The prevention of infection in open wounds. *Clin Orthop Relat Res* 1973;**96**:42—50.
2. Gustilo RB, Merkow RL, Templeman D. The management of open fractures. *J Bone Joint Surg* 1990;**72**:299—304.
3. Park P, Lodhia KR, Eden SV, Lewandrowski KU, McGillicuddy JE. Pin-site myiasis: a rare complication of halo orthosis. *Spinal Cord* 2005;**43**:684—6.
4. Paris LA, Viscarret M, Uban C, Vargas J, Rodriguez-Morales AJ. Pin-site myiasis: a rare complication of a treated open fracture of tibia. *Surg Infect* 2008;**9**:403—6.
5. Verettas DA, Chatzipapas CN, Drosos GI, Xarchas KC, Staikos C, Chloropoulou P, et al. Maggot infestation (myiasis) of external fixation pin sites in diabetic patients. *Trans R Soc Trop Med Hyg* 2008;**102**:950—2.
6. Konkol KA, Longfield RN, Powers NR, Mehr Z. Wound myiasis caused by *Cochliomyia hominivorax*. *Clin Infect Dis* 1992;**14**: 366.
7. Lindstrom T, Gullichsen E, Lertola K, Niinikoski J. Effects of hyperbaric oxygen therapy on perfusion parameters and transcutaneous oxygen measurements in patients with intramedullary nailed tibial shaft fractures. *Undersea Hyperb Med* 1998;**25**: 87—91.

Dalmiro J. Cazorla-Perfetti
Maria E. Acosta-Quintero
Pedro Morales
Laboratory of Entomology, Parasitology and Tropical Medicine (LEPAMET), Centro de Investigaciones Biomédicas, Universidad Nacional Experimental Francisco de Miranda, Coro, Falcón, Venezuela

Sergio E. Bermúdez
Medical Entomology Section, Instituto Conmemorativo Gorgas de Estudios de la Salud, Panama

Alfonso J. Rodriguez-Morales*
Instituto Experimental Jose Witremundo Torrealba, Universidad de Los Andes, Trujillo, Venezuela

*Corresponding author. Tel.: +58 4168269482
E-mail address: alfonsorm@ula.ve
(A.J. Rodriguez-Morales)

15 October 2008

Corresponding Editor: William Cameron, Ottawa, Canada